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Advanced Smart Water Dispenser with Ultrasonic Leak Detection

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ABSTRACT

Water use is currently not tracked or displayed in real time in many parts of the world, and leaks are not promptly and accurately discovered, resulting in excessive water waste. This abstract describes the implementation of a smart water measurement and consumption system with high decoupling and the integration of different technologies, allowing real-time visualisation of consumption. A leak detection algorithm that uses rules and user location is also suggested. It is able to account for 10 different water consumption scenarios, ranging from normal to abnormal. The technology enables data to be gathered by a smart meter, which is then periodically transferred to the cloud after being reprocessed by a local server (Gateway). Thanks to my project, the building's water level is maintained, and the pH of the water is checked. The amount of water that may be used in a home or building might also be restricted.

Keyword: *IoT-based, Wi-Fi module, Arduino, cloud, sensors, transmission, GSM/GPRS Module, pH, application, processor, server, ATM-based, UDSS (urban decision support system), ZigBee technology, GPR (ground infiltrating radar), PIG (pipeline investigation check), PCB (small printed circuit board).*

1. INTRODUCTION

Here, we go over the concept guiding IoT-based real-time water quality and quantity monitoring. An Arduino, a microcontroller, and a number of sensors, including pH and turbidity sensors, water flow sensors, and ultrasonic sensors, make up the system. The system's primary processor, the Arduino, controls and manages the data produced by the sensors. The Arduino device is connected to a Wi-Fi module, which facilitates data transmission to the cloud via the internet. The ultrasonic sensor aids in measuring the water level. When the flow of water reaches a certain level, it can be automatically stopped by turning off the motor or by closing the pipe with the aid of an Arduino. The water flow sensor measures how much water flows through the pipe in a specific amount of time; this information is sent to the cloud for storage and analysis. The other sensors, which measure the water quality and aid in deciding whether the water is fit for drinking or any agricultural uses, include temperature, pH, and turbidity sensors.

2. HARDWARE SPECIFICATION

- Arduino UNO

- Flow Sensor

- Ultrasonic Sensor

- Ph Sensor

- GSM/GPRS Module

- LCD

3. SOFTWARE SPECIFICATION

- Arduino IDE
- Embedded C
- HTML
- PHP
- MySQL

4. EXISTING SYSTEM

The old version power requirement in low-power networks has always been a source of contention, but now we have a solution in the form of WET (wireless energy transmission), in which a dedicated RF vitality source is used to revive sensor hubs and make them work until the time runs out. For effective and ideal charging, the sensor needs to be within the effective radius. The enhancement model suggests restricting the number of chargers anticipated to revive the system's components in a multi-bounce arrangement.

The urban decision support system (UDSS), which is connected to an Android application to gather data, will be in charge of ensuring that the water is distributed in an adequate amount. The ATM-based system is recommended to monitor water use and bill for it in accordance with a household's or business's needs. To ensure safety and make it simple to keep track of water saved or wasted, the system is secured with a security card.

The PCB (small printed circuit board) used for water leak detection is made up of numerous sensors and measures water flow to find any leaks. The conventional methods, such as GPR (ground infiltrating radar), PIG (pipeline investigation check), and the estimation of the acoustic signal, require a high examination rate, which makes the hubs consume a lot of power and operate for a short time on the available power supply. The WSN system, which uses ZigBee technology and is a low-effort, low-power remote system that focuses on remote application access, is introduced as a framework for evaluating the quality of public water assets. It consists of sensors for detecting the natural and artificial properties of water, and the frameworks, including the roads, are very expensive. Only expensive sensors can withstand the pressure of a typical street and the harsh weather. Cheaper sensors are only going to last a week at most.

Using a wireless sensor network, a remote correspondence module, real-time communication, and wide-area monitoring, the water will be tested, ensuring accurate and precise water quality monitoring. Because of the framework's product control, which can be exercised through the application, it is remarkably gradually adaptable. The module adheres to a BUS-type system with a master (main) and slave module configuration.

4.1. DRAWBACKS

• Water level controls need to be replaced every 3 years.

• The rust, foul and deteriorate.

• Electronics are usually built separately.

• More difficult installation.

• Most float switches are outdated.

• No LED indicator lights.

• No Warranty or Guarantee.

6. PROPOSED SYSTEM

As is well known, water is essential to human existence as well as the survival of all of nature. Without it, neither can exist. Even though the government has implemented numerous programmes, it is getting harder and harder to conserve water for the future and use it effectively. An IoT design for water monitoring and control that supports real-time, internet-based data collection is proposed in this work. This system is being suggested for use in densely populated residential structures like hotels, lodges, hostels, dorms, apartments, shopping centres, etc. Additionally, this system can offer a thorough analysis of water usage in each individual room.

In the proposed system the following parameters can be known

- The level of water in the tank by using the ultrasonic sensor and can reduce overflow of the water.
- The usage of the water in the tank can be used to control the wastage of the water.
- To know the temperature in the water tank in real time

6.1 FEATURES

Reduce the amount of water waste from industries like agriculture, manufacturing, and power production. It implies the adoption of high-tech methods in agriculture, such as precision farming, smart irrigation, crop water management, real-time water metering, and other Internet of Thing’s applications. Learn more about our services for developing agricultural software. Improve the quality of the water and guard against natural pollution like acidification as well as chemical waste contamination. Companies use sensors and IoT technology for real-time monitoring and control to enhance and maintain the quality of water.

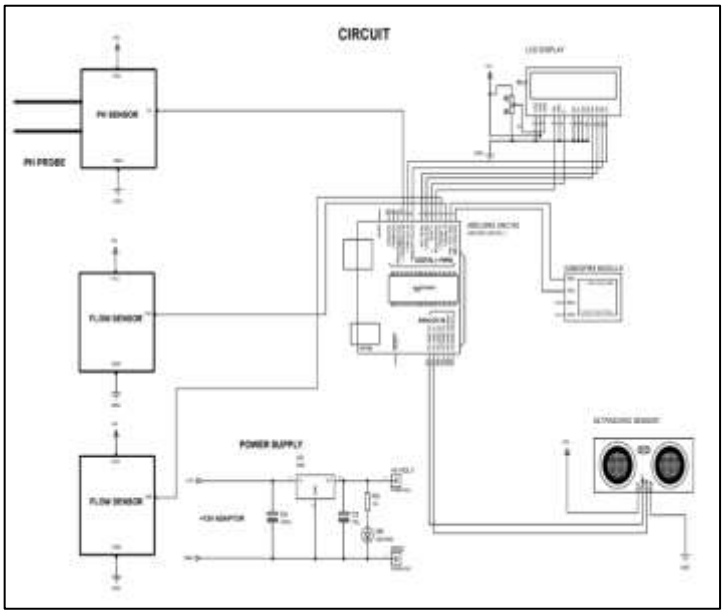
Boost the effectiveness of water systems like reservoirs, treatment facilities, distribution mains, and wastewater recycling facilities. Using IoT and data solutions for asset management, businesses can integrate predictive maintenance, keep track of crucial measurements like water pressure, temperature, flow, etc., and prevent equipment breakdown and downtime. Utilize smart water management tools with moisture and leak sensors to implement leakage control. Leakage control is crucial to protecting water resources and budgets because it costs almost $3 billion annually to repair the harm caused by leaks.

Utilize IoT-based water management systems to practise consumption monitoring. At various levels—households, communities, nations, and the entire planet—it aids in maximising and maintaining control over the use of water resources.

7. METHODOLGY FOR SENSORS

This system takes care of flow rate measurement and supply planning to reduce water waste and promote water conservation. It also uses ph and flow rate sensors to measure the quantity and quality of water distributed to each household. The system has been created so that it will continuously check the level of water that is available. The system was developed using an embedded system, and IoT will be used for communication.

A prototype IoT-based water monitoring system is shown. Some sensors are employed for this. The data gathered from all of the sensors is used for analysis to improve solutions to water problems. The Wi-Fi module transmits the data to the cloud server. Consequently, this application will be the best competitor in the real-time monitoring and control system and be used to address all water-related issues.



7.1 WORKING METHODOLGY IN CLOUD ENVIRONMENT

The sensor data is sent to the cloud using a GSM/GPRS Module in this system. The GSM/GPRS Module is connected to all of the sensors. The GSM/GPRS Module requires access to the internet. So, in this case, mobile data or Wi-Fi is the internet access point. And then all of this data is sent to the cloud.

We can access the cloud by connecting a GSM/GPRS Module, or we can access the cloud by connecting a database link that stores the system's data online and is always accessible. We can also set a task that the system can execute, or we can control and set conditions for the system.

8. CONCLUSION & FUTURE SCOPE

In this paper, a prototype IoT-based water monitoring system is presented. Some sensors are used for this. The information gathered from all of the sensors is used for analysis to help find better solutions to water issues. Through the GSM/GPRS Module, the data is sent to the cloud server. Therefore, this application will be the best competitor in the real-time monitoring and control system and will be used to address all water-related issues.

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